



Paramo, J., S. Bertrand, **H. Villalobos Ortíz** & F. Gerlotto (2007). A three-dimensional approach to school typology using vertical scanning multibeam sonar. *Fisheries Research*, 84(2): 171-179. DOI: 10.1016/j.fishres.2006.10.023

A three-dimensional approach to school typology using vertical scanning multibeam sonar

Jorge Paramo, Sophie Bertrand, Héctor Villalobos Ortíz & François Gerlotto

Fish school typology is usually based on vertical echosounding images. These images provide little objective information on school structure (internal characteristics) or morphology (external characteristics). This paper considers the possibility of using multibeam sonar for 3D recording of the external morphology and internal structure of schools, to enhance the identification of typological criteria. We used recordings of 668 schools obtained from three different regions (Senegal, 68; Venezuela, 343; Mexico, 257) on two different Clupeids (Venezuela and Senegal: *Sardinella aurita*; Mexico: *Sardinops sagax*). We extracted 26 parameters (4 geographical; 6 morphological; 16 structural) from each school in the data base, using geostatistics and 3D image-reconstruction software. The schools were very homogeneous in most of their characteristics, presenting unimodal distributions of most parameters. Structural variables presented a higher power of discrimination (significant differences among zones, species and positions in the water column) than morphological ones. Multivariate statistics (principal component analysis followed by mixed hierarchical classification) allowed the definition of four main classes of schools. The conclusion is that the structural data provided by multibeam sonar improves the possibility of obtaining a consistent typology.

Palabras clave: Fish school characteristics, Multibeam sonar, School morphology, School internal structure

Para obtener copia del documento contacta con el autor (hvillalo@ipn.mx) o con el personal de la biblioteca (bibliocicimar@ipn.mx).